U.S. Department
of Transportation

**Research and
Special Programs
Administration**

400 Seventh Street, S.W.
Washington, D.C. 20590

COMPETENT AUTHORITY CERTIFICATION FOR A TYPE B( ) RADIOACTIVE MATERIALS PACKAGE DESIGN CERTIFICATE USA/4888/B( ), REVISION 4

This certifies that the radioactive materials package design described below has been certified by the competent authority of the United States as meeting the regulatory requirements for a Type B( ) packaging for radioactive materials as prescribed in the International Atomic Energy Agency[1] and USA regulations.[2]

1. Package Identification - Model Nos.: Sentinel-25A, LGC-25A; Sentinel-25B, LGC-25B; Sentinel-25C, LGC-25C; Sentinel-25C3, -25D, -25E, and -25F.

2. Packaging Description and Authorized Radioactive Contents - as described in Nuclear Regulatory Commission Certificate of Compliance No. 4888, Revision 8 (attached).

3. GENERAL CONDITIONS -

   a. Each user of this certificate must have in his possession a copy of this certificate and all documents necessary to properly prepare the package for transportation.

   b. Each user of this certificate, other than the original petitioner, shall register his identity in writing to the Office of Hazardous Materials Transportation, Research and Special Programs Administration, U.S. Department of Transportation, Washington D.C. 20590.

   c. This certificate does not relieve any consignor or carrier from compliance with any requirement of the Government of any country through or into which the package is to be transported.

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1 "Safety Series No. 6, Regulations for the Safe Transport of Radioactive Materials, 1967 Edition" published by the International Atomic Energy Agency (IAEA), Vienna, Austria.

2 Title 49, Code of Federal Regulations, Parts 100 - 199, USA.

CERTIFICATE USA/4888/B( ), REVISION 4

d. This certificate is issued only to authorize transport from point of entry to final destination within the United States and from point of origin in the United States to point of exit.

4. Marking and Labeling - The package shall bear the marking USA/4888/B( ) in addition to other required markings and labeling.

5. Expiration Date - This certificate expires on November 30, 1991.

This certificate is issued in accordance with the 1967 edition of the IAEA Regulations and Section 173.471 of Title 49 of the Code of Federal Regulations, and in response to the September 16, 1988 petition by Department of the Navy, San Francisco, CA, and in consideration of the associated information therein.

Certified by:

Michael E. Wangler

Michael E. Wangler
Chief, Radioactive Materials Branch
Office of Hazardous Materials Transportation

OCT 12 1988
(DATE)

Revision 4 - Issued to incorporate Revision 8 of U.S. Nuclear Regulatory Certificate of Compliance No. 4888, and to extend the expiration date.

NRC FORM 618
(8-85)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIALS PACKAGES

1.a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. PACKAGE IDENTIFICATION NUMBER	d. PAGE NUMBER	e. TOTAL NUMBER PAGES
4888	8	USA/4888/B( )	1	4

2. PREAMBLE

a. This certificate is issued to certify that the packaging and contents described in Item 5 below, meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

Teledyne Energy Systems
110 West Timonium Road
Timonium, MD 21093

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION:

Teledyne Energy Systems applications dated April 26, 1985 and August 19, 1986, as supplemented.

c. DOCKET NUMBER

71-4888

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model Nos.: Sentinel-25A, LCG-25A; Sentinel-25B, LCG-25B; Sentinel-25C, LCG-25C; Sentinel-25C3,-25D,-25E, and-25F

(2) Description

The packages are thermoelectric generators. The major components include the main housing, tungsten shield, housing flange, and electrical connectors. The approximate dimensions and weights for the various Model Nos. are as follows:

Model No.	Dimensions (inches)	Weight (lbs.)
Sentinel-25A, LCG-25A	25 OD x 25	3000
Sentinel-25B, LCG-25B	25 OD x 25	3300
Sentinel-25C, LCG-25C	24 OD x 32	2000
Sentinel-25C3	24 OD x 32	1300
Sentinel-25D	25 OD x 27	3300
Sentinel-25E	25 OD x 34	4200
Sentinel-25F	24 OD x 32	1400

(3) Drawings

The packagings are constructed in accordance with the following Drawing Nos:

5. (a) Packaging (continued)

(3) Drawing Nos.

Model No.	Drawing Nos.
All Models	Isotopes, Inc. Drawing Nos.: 001-20000, Rev. E 001-20001, Rev. F 001-20002, Ref. F 001-20003, Sht. 1, Rev. B 001-80003
Sentinel-25A, LCG-25A	Martin Company Drawing Nos.: N0013100, Rev. A N0013108, Rev. D 001-40000, Rev. A Isotopes, Inc. Drawing Nos.: 001-10000, Rev. B 001-70024, Rev. C 001-70025, Sht. 1, Rev. D 001-70033, Shts. 1 & 2, Rev. A 001-70036 001-80005
Sentinel-25B, LCG-25B	Martin Company Drawing Nos.: N0013200, Rev. C 001-40012 Isotopes, Inc. Drawing Nos.: 001-70024, Rev. C 001-70025, Sht 1, Rev. D 001-70033, Shts. 1 & 2, Rev. A 001-70036 001-80005
Sentinel-25C, LCG-25C	Martin Company Drawing Nos.: 001-40004, Rev. A 001-70010 001-70012, Rev. B 001-80004 Isotopes, Inc. Drawing Nos.: 001C10000, Sht 1, Rev. D & Sht. 3 001-70009, Rev. D
Sentinel-25C3	Isotopes, Inc. Drawing Nos.: 001C10000 Shts. 1 & 2, Rev. D 001-70009, Rev. D 001-70057, Rev. D 001-70060, Rev. C 001-40019, Rev. B

Sentinel-25D	Martin Company Drawing No. 001-80004 Isotopes, Inc. Drawing Nos.: 001D10000 Shts. 1 & 2, Rev. C 001-70036 001-70033 Shts. 1 & 2, Rev. A 001-70025 Sht. 1, Rev. D 001-70024, Rev. C 001-40015, Rev. C 001-40006, Rev. B
Sentinel-25E	Isotopes, Inc. Drawing Nos.: 001E10000, Shts. 1 & 2, Rev. E, & Sht. 3 001-70039, Rev. C 001-70025, Sht. 1, Rev. D & Sht. 2 001-70024, Rev. C 001-40017, Shts. 1 & 2, Rev. D 001-40006, Rev. B
Sentinel-25F	Isotopes, Inc. Drawing Nos.: 001F10000, Shts 1 & 2, Rev. H* 001-70070, Rev. C 001-70060, Rev. C 001-70009, Rev. D 001-40025, Rev. A

*As modified by Figure 1 of the April 26, 1985 application.

(b) Contents

(1) Type and form of material

(i) Strontium 90 titanate doubly encapsulated in a Hastelloy or Uniloy fuel capsule which meet the requirements of special form radioactive material; or

(ii) Model No. Sentinel-25F may have, strontium fluoride doubly encapsulated in a Hastelloy or Uniloy fuel capsule, with a Hastelloy C-276 liner which meets the requirements of special form radioactive material.

(2) The maximum quantity of material per package

125,000 curies

6. A barrier (permitting the free circulation of air) must be provided with sufficient separation distance to ensure that the requirement of §71.43(g) will be met.

7. Eye-bolt shall be removed or covered during transportation to prevent their use as tie-down devices of packages.

8. The packages authorized by this certificate are hereby approved for use under the general license provisions of 10 CFR §71.12.

9. Expiration date: November 30, 1991.

REFERENCES

Teledyne Energy Systems applications dated April 26, 1985; and August 19, 1986.

Supplement dated: November 3, 1986.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

for Charles E. MacDonald, Chief
Transportation Certification Branch
Division of Fuel Cycle and
Material Safety, NMSS

Date: NOV 20 1986

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

Transportation Certification Branch
Approval Record
Model Nos. (Sentinel or LCG) 25A, 25B, 25C,
25C3, 25D, 25E, and 25F Packages
Docket No. 71-4888

By application dated August 19, 1986, as supplemented November 3, 1986, Teledyne Energy Systems requested renewal of Certificate of Compliance No. 4888. A consolidated application was submitted which incorporated all pertinent information from the applications and supplements previously referenced by the certificate of compliance. The consolidated application was submitted in the form of six reports, one for each of the packaging model numbers. A seventh report, addressing the Sentinel-25F, was submitted by application dated April 26, 1985, and incorporated into the certificate of compliance as discussed in the Approval Record dated July 19, 1985.

A review of the consolidated application, as supplemented, confirmed that all appropriate supplement information along with the original applications have been incorporated into the consolidated application. The consolidated application contained additional packaging drawings which provide additional information and clarification of the packaging designs. The listing of packaging drawings in the certificate of compliance has been revised to include the additional drawings and to indicate the revision level of all drawings.

No changes have been requested or made to the package since approval of the latest supplement dated April 20, 1970.

Based on the staff's review of the consolidated application and the conditions stated in the certificate of compliance, the staff concludes that the requirement for renewal of the certificate of compliance has been satisfied.

for Charles E. MacDonald, Chief
Transportation Certification Branch
Division of Fuel Cycle and
Material Safety, NMSS

Date: NOV 2 0 1986

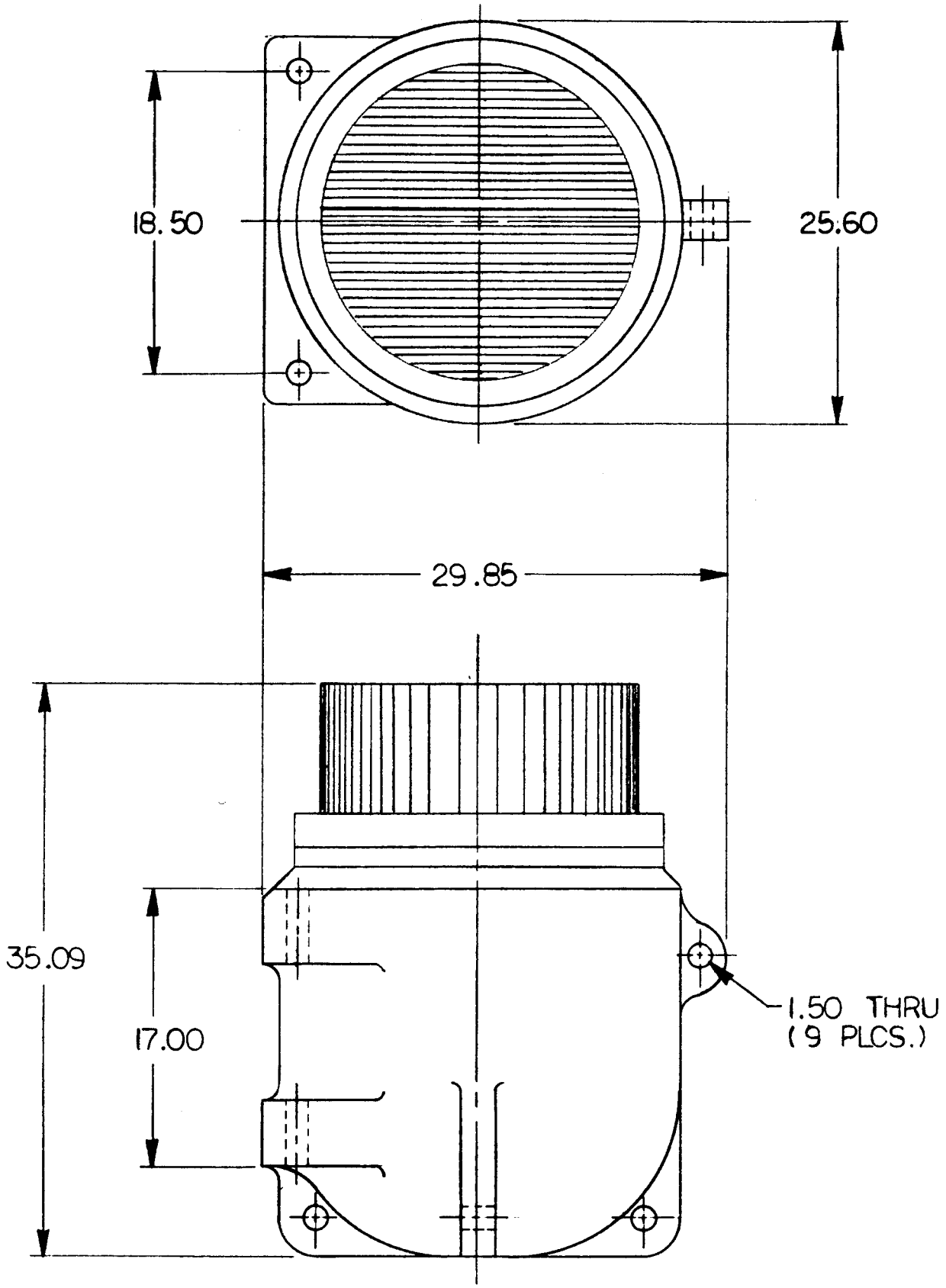

FIGURE II-2. SENTINEL 25A EXTERNAL DIMENSIONS (IN INCHES)

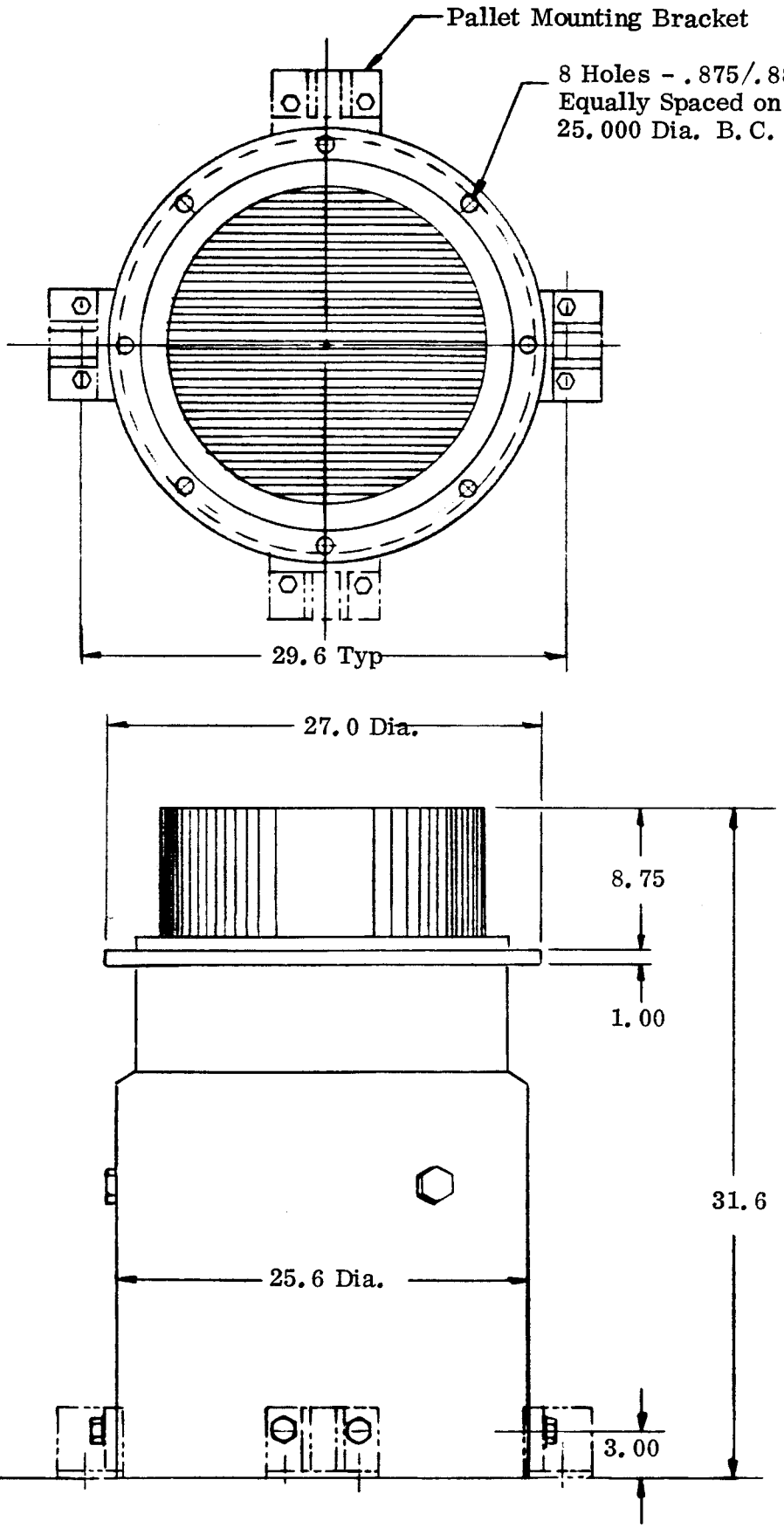

FIGURE II-6. SENTINEL 25E EXTERNAL DIMENSIONS (IN INCHES)

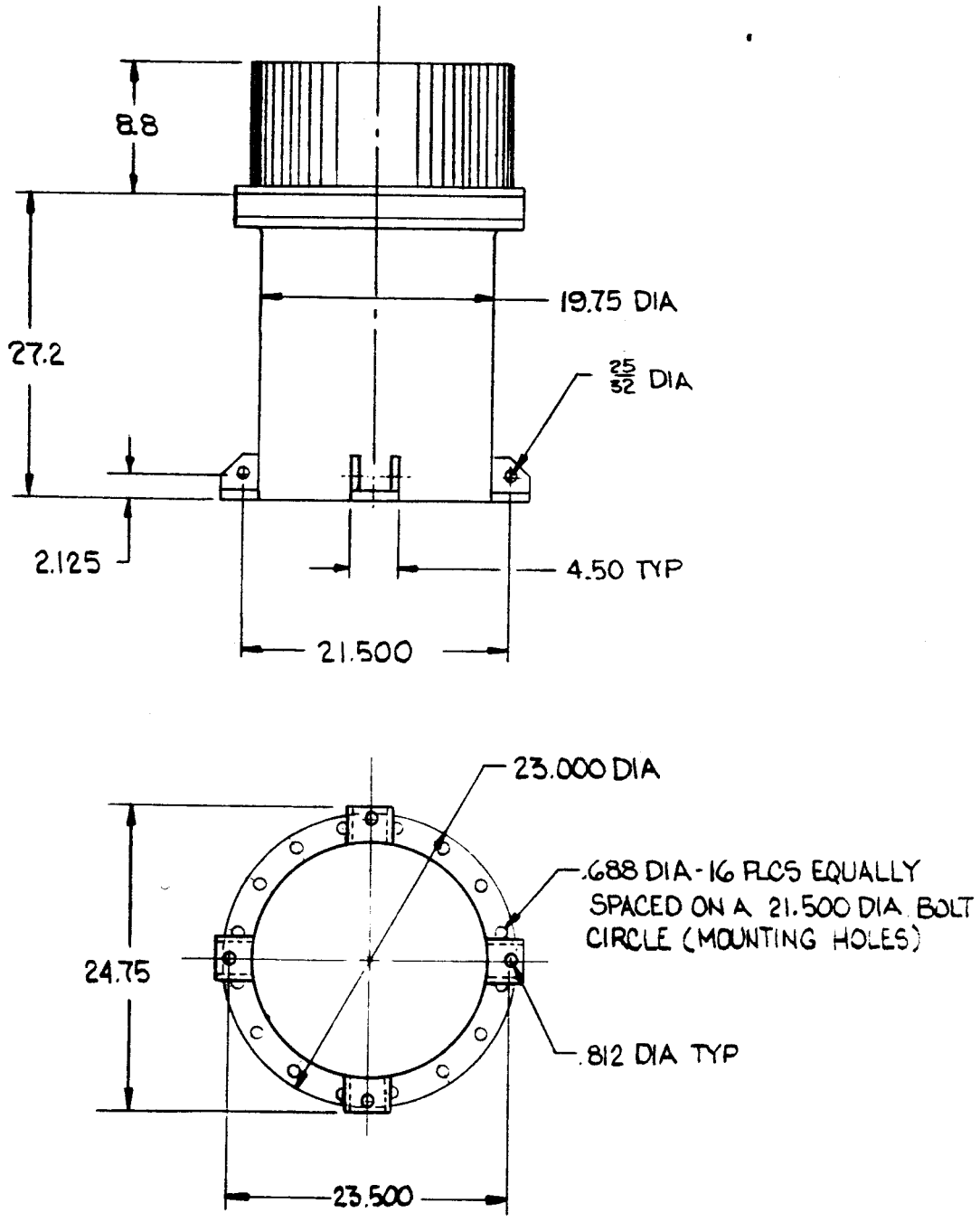

FIGURE II-10. SENTINEL 25F EXTERNAL DIMENSIONS (IN INCHES)